

## DESCRIPTION

TRANSFER DEVICE FOR INFORMATION CARRIERS

[0001] The present invention relates to transfer devices ensuring the loading/unloading of information carriers in/from record and/or playback apparatuses and particularly to those for information carriers of a substantially circular periphery such as  
5 optical, magnetical discs, CD, DVD,... It relates more particularly to transfer devices for those information carriers appearing in two configurations different in size and/or thickness as, for instance, bare discs and discs housed in protective cartridges such as the one disclosed in the US 4,377,538 of the Applicant.

10 [0002] Devices have been developed for information carriers of different configurations such as those disclosed in the US 5,867,338 and EPA 1.087.388 which ensure the loading of bare discs and cartridges holding discs but working-out respectively either elements selected by the user himself before he inserts the carrier (US  
15 5,867,338), or loading means adapted to each type of carrier (EPA 1.087.388), for instance one for bare discs and another one for discs housed in cartridges. Such devices are thus complex, expensive and require a lot of space.

[0003] The aim of the present invention is to  
20 overcome the above-mentioned drawbacks by providing a single, simple, low cost, reliable, compact device ensuring the transfer of information carriers having substantially the same profile, but of configurations different in size and/or thickness, by adapting, during said transfer, simultaneously and automatically the driving and  
25 clamping means of the apparatus to the inserted information carrier.

[0004] A further aim of the invention is to work-out, by controlling them differently, means already provided in transfer devices to limit the increase of parts, the additional cost, the overall height and the required space.

5 [0005] Another aim of the invention is to avoid requiring any specific manipulation/selection by the user before he inserts a carrier into the apparatus.

[0006] The device according to the invention is characterized by the content of the main claim.

10 [0007] Further characteristics, advantages, particularities of the invention will appear from the preferred embodiment, hereafter described in a non-limiting way and to which further improve-ments, modifications can be brought without departing from the scope of the invention, in conjunction with the  
15 drawings for which:

- fig. 1 is a summary top view of an apparatus incorporating the device, a part of the frame being cut-away for clarity purposes, said apparatus being in the operative playback position of a disc housed in a cartridge,

20 - fig. 1A is a partial view similar to fig. 1, but at a smaller scale, the carrier being a bare disc,

- fig. 2 is similar to fig. 1A, the apparatus being in its inoperative position of ejection/ insertion,

25 - fig. 3 is a partial section view of the apparatus of fig. 1, along the section plane A-A,

- fig. 4 is a simplified view of fig. 3 showing only the essential elements of the device of the invention,

- fig. 4A is a top view of a detail of fig.4,

- fig. 5 is similar to fig. 3 but for a bare disc,

30 - fig. 6 is similar to fig. 4 but for the device of fig. 5,

- fig. 6A is similar to fig. 4A for the device shown on figs. 5 and 6,

- fig. 7 discloses an element of figs. 1 to 5,

35 - fig. 8 is a perspective view of an essential element of the invention.

[0008] For clarity and simplicity purposes, only the elements strictly necessary for the understanding of the invention appear on each figure.

[0009] In the described embodiment, the information carrier is a standard optical disc such as CD, DVD,... also called compact disc, digital versatile disc, ... used either bare (carrier of a small thickness) or enclosed in a cartridge (carrier of different dimensions: thickness and diameter larger than those of a bare disc) similar to the one described in the US 4,377,538 of the Applicant.

[0010] Turning to the figures, the apparatus incorporating the transfer device comprises a fixed frame 1 provided with a semi-circular opening 3 allowing an easy pick-up of an information carrier 5, 7 by its central hole 9 in the eject position (fig. 2). The apparatus comprises notably two pairs of mobile rollers 12, 14, having V-shaped profiles powering an appropriate centering of the information carrier 5, 7 during its transfer; the rollers 12, 14 being not essential elements for the understanding of the invention, they appear schematically without their complete mechanism. By the way, any other centering mechanism could be worked-out. The transfer device includes a mobile frame 20 bearing a rack 22 (figs. 3 to 6) powered by a micro-motor (not shown) through a gears train 24. This mobile frame 20 supports a sub-frame 21 also mobile thanks to the combination, on one hand, of grooves 26 provided in the frame 20 and shafts 27 set on the sub-frame 21; these shafts 27 bearing one pair of rollers 12 and on the other hand, of grooves 28 provided in the sub-frame 21 and studs 29 set on the frame 20. The mobile frame 20 bears laterally a pair of support means 30, such as shafts (only the left one is shown) around which detection means can move, in the described embodiment pivot, such as feelers 32 (figs. 4, 6, 8) provided with resilient means (not shown), urging them to pivot anti-clockwise. Each feeler 32 bears a shaft 34 around which linking means 40, such as a ratchet, can rotate under the action of resilient means 41, such as a leaf spring, urging a pivotal movement in the direction of the arrow F (figs. 1 to 2, 4A, 6A, 8). So, the detection means or feelers 32 may pivot in a substantially vertical plane while the linking means or ratchets 40 may pivot in plane different from that of the feelers 32,

here in a substantially perpendicular plane. These ratchets 40 bear at one of their ends a profile 42 shaped as a hook (figs. 4A, 5A, 8) cooperating with discontinuities such as projections 50A, 50B (figs. 4, 6, 7) being, preferably and for the simplicity of the device, integral with sliders 52 (only the left one is shown) supported and guided by openings 54 provided in the fixed frame 1 (fig. 1). The projections 50A, 50B are set at space-apart levels (fig. 7).

[0011] Each slider 52 bears on the external side opposite to that bearing the projections 50A, 50B, two grooves 56, 57 (fig. 7) having a S-shaped profile for guiding studs 60, 61 (figs. 3, 4, 5, 6), respectively supported by clamping means 63, working-out for instance a magnet 64 (figs. 3, 5), by driving means 65, working-out for instance a motor 66 bearing a turntable 67 supporting the information carrier 5, 7; these two means pivoting around fixed shafts 70, 72 supported by the lateral sides 2 of the apparatus. So, during the loading of the support, each slider 52, while moving longitudinally, ensures that the clamping 63 and driving 65 means pivot around their shafts 70, 72 to clamp and drive the information carrier 5, 7 when it is to be set in operative position, whether said carrier be a bare disc 7 or a cartridge 5 (figs. 3, 5). Upon ejection of the information carrier 5, 7, the sliders 52 ensure the pivoting of the clamping 63 and driving 65 means in the opposite direction to move them away from the carrier and thus allow its transfer to its inoperative position of ejection/insertion. Of course, one can imagine that only one of the clamping and driving means be movable as it is their relative movement which sets the information carrier 5, 7 in its operative, inoperative positions.

[0012] The ratchets 40 and projections 50A, 50B on the sliders 52 synchronize the mobile frame 20 powered by the rack 22 with the means setting the operative position, for instance the clamping 63 and driving 65 means such as disclosed hereafter.

[0013] Upon the loading of an information carrier 7 of small thickness – bare disc – the feelers 32 (fig. 6) remain at their lower level under the action of their resilient means, a level at which they do not enter into contact with the surface of the information carrier 7 while the ratchets 40 are thus at their higher position. So,

the hooks 42 cooperate with the projections 50A (figs. 6, 6A) to connect the movement of each slider 52 to that of the rack 22 and the mobile frame 20.

[0014] During the loading of an information carrier 5 having a larger thickness – a cartridge – said carrier encounters the feelers 32 which then pivot around their shaft 30 against their resilient means (fig. 4) to move the ratchets 40 downwards and thus force their hooks 42 to cooperate with the projections 50B (figs. 4, 4A) in order to connect the movement of each slider 52 to that of the rack 22 but with a delay compared to an information carrier 7 of small thickness.

[0015] The setting of the hooks 42 is such that they are locked on the projections 50A, 50B when the mobile frame 20 is shifted in the direction of the arrow G (figs. 1 to 2, 4, 5), their pivoting shafts 34 being located in-between the hooks 42 and their driving means, that is to say the mobile frame 20. Moreover, each ratchet 40 includes a substantially vertical leg 44 (fig. 8) protruding of openings 54 provided in the fixed frame 1 (figs. 1, 1A) and of a profile which locks said leg 44 to prevent any pivoting of the ratchets 40 and thus to ensure the effective locking of the hooks 42 on the projections 50A, 50B in case of vibration or shock.

[0016] Thus, the feelers 32 and the ratchets 40 ensure the synchronization between the transfer of the information carriers 5, 7 and the means ensuring their setting in operative position, in the described embodiment, the clamping 63 and driving 65 means, by working-out a single mechanism requiring no particular care or manipulation from the user.

[0017] During the ejection or the unloading of an information carrier 7 of small thickness – bare disc -, the sliders 52 are shifted in synchronism with the rack 22 in the direction opposite to that of the arrow G. The profile of the hooks 42 is such that the force imparted by the mobile frame 20 on the ratchets 40 tends to pivot them in the direction opposite to that of the arrow F for disengaging them from the projections 50A but this movement is opposed by the profile of the openings 54 locking the leg 44 of the ratchet 40 for preventing any pivoting. Said carrier 7 is then totally free from its clamping 63 and driving 65 means. Simultaneously, the

clearance 55, provided in the profile of each opening 54 (figs. 1 to 2), unlocks the leg 44, thus allows the ratchet 40 to pivot around the shaft 34 and, as a result, the hooks 42 to disengage from the projections 50A. The ratchets 40 are then disconnected from the sliders 52. The mobile frame 20, powered by the rack 22, allows the information carrier 7, supported by the pairs of rollers 12, 14, to be ejected from the apparatus for being picked-up by its central hole 9. The feelers 32, once the carrier 7 has been removed, remain pivoted in their lower position under the action of their resilient means, thus the ratchets 40 stay at their higher position, ready for the insertion of an information carrier 5 or 7.

[0018] Upon the unloading of an information carrier 5 of a larger thickness – a cartridge -, the sliders 52 are shifted in synchronism with the rack 22 in the direction opposite to that of the arrow G. In the same way, the profile of the hooks 42 enables the traction effort generated by the mobile frame 20 to pivot said hooks in the direction opposite to that of the arrow F to disengage them from the projections 50B but this movement is opposed again by the profile of each opening 54 locking the leg 44 of the ratchets 40. Said carrier 5 is then totally free from its clamping 63 and driving 65 means. Simultaneously the clearance 55, provided in the profile of each opening 54, unlocks the legs 44, allowing the hooks 42 to disengage from the projections 50B and thus the ratchets 40 to pivot and move away from the sliders 52. The mobile frame 20, powered by the rack 22, allows the information carrier 5, supported by the pairs of rollers 12, 14, to be ejected from the apparatus for being picked-up by its central hole 9. The feelers 32, once the carrier 5 has been removed, pivot anti-clockwise towards their lower position under the action of their own resilient means, as a result, the ratchets 40 are set at their higher position, ready for the insertion of an information carrier 5 or 7.

Legend:

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| 1   | fixed frame         |
| 2   | lateral walls       |
| 3   | opening             |
| 5,7 | information carrier |

	9	central hole of 5, 7
	12, 14	mobile rollers
	20	mobile frame
	21	sub-frame
5	22	rack
	24	gears train
	26	groove
	27	shaft
	28	groove
10	29	stud
	30	upport means, shaft
	32	detection means / feeler
	34	shaft
	40	linking means / ratchet
15	41	resilient means/leaf spring
	42	profile / hook
	44	leg
	50A, 50B	projection
	52	slider
20	54	opening
	55	clearance
	56, 57	groove
	60, 61	stud
	63	clamping means
25	64	magnet
	65	driving means
	66	motor
	67	turntable
	70, 72	fixed shaft
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